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Joseph Warren Zambra.

1822-1897.

JUST at the close of the year we have to announce, with regret, the death of Mr. Zambra, the last of the trio to whom—especially in the period 1850-1870—we are chiefly indebted for the excellent instruments now used at meteorological stations. Mr., or to give him his proper title, Cavaliere Negretti, passed away first, and now in 1897 we have lost both Mr. Casella and Mr. Zambra. Happily—though perhaps no one ever surpassed Negretti as a glass blower—they have all imparted much of their knowledge to their successors, and all have left sons to, we hope, worthily follow in their fathers' footsteps.

GALE ON NOVEMBER 28TH, 1897.

UNDER this title we gave last month some remarks contrasting the proportion of damage due to wind force and wave action, and stated that "The mischief was due to tidal action rather than to that of wind." We then little thought what excellent data upon the subject were being collected, but on the very day that the *Met. Mag.* was published an excellent account of the flooding appeared in the *Engineer* of December 17th, 1897, signed by Mr. Wheeler, C.E. of Boston, probably the most competent authority in the world.

Now, thanks to Mr. Wheeler's kindness, we are able to offer to our readers what may, perhaps, be regarded as a second edition of the report, with such additions as Mr. Wheeler received after that in the *Engineer* had been printed.

In our own little note we made one incorrect statement, and we are glad that it has been detected, because it shows how sharply our words are watched, and it keeps us up to the mark. We said that the mischief was due "to the intensity of the storm occurring at nearly the time of high water spring tide." Happily the spring

tides had passed four or five days, or the damage would have been, as Mr. Wheeler says, "even more serious." We fell into the error through knowing that as an actual fact the level reached was much above that of "high water spring tide," but the cause was wind, rather than tide.

THE NOVEMBER GALE AND THE TIDES.

By W. H. WHEELER, M. Inst. C.E.

The subject of the effect of the wind and atmospheric pressure on the tides was brought before the British Association at the Ipswich meeting in 1895, in a paper read by me, and in the following year at Liverpool, a report on the same subject was presented by a committee which had been appointed to investigate the matter. With the aid of information kindly furnished to me in reply to my inquiries from the harbour masters of several ports round the coast, I am able to supplement the information already given, by the following account of the effect on the tides of the gale of November last.

The severe gale of the 28th and 29th of November, which caused such serious damage all along the south-east coast of this country, had the effect of raising the tide to an abnormal height, the tide of the following day being considerably depressed. The wind appears to have had the greatest effect in increasing the height of the tide along the part of the coast extending from the Humber to the east end of the English Channel. The wind on the previous days had been blowing strongly from the south-west, a condition favourable to increasing the height in the Channel; it then flew round to the north-west, a quarter which always raises the tide in the North Sea. The combined influence of the winds from these two opposite quarters would therefore tend to concentrate the full effect of the tide along the south-eastern coast, and the records of the damage done to the cliffs and in flooding, owing to the water breaking through or flowing over the banks, and doing other damage, show that this was the case. Fortunately, the gale occurred five days after the full moon, or the effect would have been even more serious.

On Saturday, the 27th, round the south and east coasts the wind was blowing all day strongly from the south-west, the force varying, according to the different reports received, from 5 to 7 of the Beaufort scale; the barometer varying from 29·92 in. at Spurn Point, to 30·13 in. at the North Foreland. On Sunday the barometer had fallen to 29·49 at Spurn and 29·76 at the North Foreland, continuing to fall to 29·10 towards Monday; the wind blowing from the north-west with force of 10, veering to south-west on Tuesday, with force of 3 to 6. New moon was on the 24th, so that the spring tides were falling off. Under these conditions the effect of the gale in raising and depressing the tide was as follows:—

At Sunderland the increase from the computed normal height was 2ft. 10in., and at Tynemouth 2ft. 4in.

At Spurn the water washed over the lifeboat cottage and inn, and carried away a great part of a large chalk and timber groin constructed for the protection of the point.

At Grimsby the morning tide of the 29th rose 5ft. 11in. above the calculated height, the next day's tide being 1ft. 9in. less, the actual difference in height between the two tides being 8ft. 9in. At Hull the tide was 5ft. 3in. above the normal height.

At Cleethorpes, at the mouth of the Humber, at high water the tide swept the Promenade from end to end, and carried away the whole of the sea defences which have recently been constructed for the protection of the town and land.

At Mablethorpe, and lower down the Lincolnshire coast to Skegness, the tide did considerable damage to the sand dunes, in some places running over the banks and flooding the land and gardens behind, and doing an immense amount of damage to bathing machines, boats, and the promenades.

In the Wash the morning tide rose 5ft. 3in. above the calculated height at Boston Dock, the difference between this tide and that of the following day being 8ft. 8in. At Lynn the increase was 7ft., the difference between the two tides being 11ft. 11in., the effect of the wind from the north-west being more felt here than on the other side of the Wash, a large amount of damage was done in the flooding of houses and granaries, in some cases the water rising 4ft. above the floors. A portion of the permanent way of the Hunstanton Railway was washed away owing to the tide flowing over the banks near Heacham, and traffic was stopped.

At Holme, Thornam, Burnham, Cley, and Blakeney, the sea banks which enclose the Marsh land were overflowed and broken, and were injured to an extent requiring several thousand pounds to reinstate them. The lands were flooded, and the houses of the inhabitants submerged; at the village of Salthouse the lower rooms of 90 houses having been submerged.

At Wells also the water found its way into the houses and shops.

At Sheringham, Cromer, and Mundesley great damage was done to the cliffs; and at Palling the high tide carried away several feet of the sand hills.

Between Winterton and Happisburgh the sand hills were clean cut down from five to twelve yards.

Owing to the height of the tide the salt water was driven for an unusual distance up the rivers which run through the Broads, killing great numbers of fresh water fish.

At Horsey Gap, several breaches were made in the sea bank, through which the tide poured and inundated the land at the back.

All along the coast from the Wash to the Thames the tide was abnormally raised, the increase at Yarmouth being 8ft., or 2ft. more than the full rise of a spring tide, the difference between this and the tide of the following day being 9ft. 3in. The quays, marine drive, and the beach garden at Yarmouth were all flooded.

At Lowestoft some of the principal streets of the town were flooded, the masonry of the esplanade was broken down, and the embankment of the railway so damaged at Oulton that traffic had to be suspended.

At Harwich the water broke over the sea bank, carrying a laden barge through a breach into the street. Nearly 300 cottages were flooded to a depth of 6ft.

At Aldeburgh a large breach was made in the sea wall, the land and houses were inundated, and the permanent way of the railway was undermined.

At Ipswich the increase on the tide of the day was 6ft. 6in. An immense amount of damage was done all along this part of the coast by the breaking down of the cliffs.

At the mouth of the Thames the damage done by the high tide and gale was greater than on any other part of the coast.

The banks of Canvey Island suffered considerably, a large area of the enclosed land being flooded. The tide flowed over the bank from Leigh to Pitsea Island and also that at Purfleet, inundating the land behind, and also the houses in the village of Leigh.

Tilbury Marshes and the whole of the lower part of Grays were inundated to a depth of several feet, and the Tilbury Railway was under water in several places.

At Gravesend, the tide rose to 3ft. 4in. above Trinity high-water mark, or within 5in. of the great tide of 1881, the highest on record, the difference in height between this and the tide of the next day being 7ft. 5in. At the Victoria and Albert Dock it was 4ft. 5in. above the expected height, the following tide being 1ft. 11in. less than expected, the actual difference in height between the two tides being 7ft. 4in.

In London the water was nearly level with the top of the parapet of the Embankment and the footway was flooded. The Custom House Pier and several of the low-lying streets, both on the east and west sides of the river, were flooded, in some cases knee deep. Many basement floors were completely submerged and the cellars filled with water. Even up the river as high as Richmond the tide flowed over the towing path and the Twickenham Embankment.

At Blackfriars Bridge the tide rose to 4ft. 9in. above Trinity high water mark, and at Hammersmith to 4ft. 6in.

At Woolwich, where the Arsenal wharves are 4ft. above high water of spring tides, the water flowed over them, and it was only by the help of a great number of troops who were called out to assist, that a large amount of ammunition and stores placed ready for shipment was saved from destruction. The greater part of the Arsenal was flooded, and the fires in the boilers belonging to the electric light plant extinguished.

At Chatham considerable damage was done by floods, and at Rochester the gas works were inundated to a depth of 8ft. Between Sheerness and Queenborough the land was flooded, the water flowing over the railway into Blue Town, flooding the streets and filling the lower floors of the houses, from which the inhabitants had to be removed by boats. The tide broke over the dockyard wall and flooded all the lower portions of the yards and the basement of the Royal Naval Barracks to a depth of 8ft.

At Sheerness the water was 2ft. deep in the streets, and a large area of land in the neighbourhood inundated, the seawall near Scrapsgate having given way. The sewage outfall at West Minster was flooded and the pumping operations stopped ; the railway line was also flooded. At Whitstable the tide overflowed the banks two hours before high water and swept across the Salts, carrying with it fences and storehouses, and breaking into the dwelling-houses. Some of the houses were under water to a depth of 8ft., and the High Street was from 3 to 4ft. under water. At Sittingbourne also great damage was done to the river wall, the water flowing a distance of two miles inland ; great numbers of sheep and cattle were drowned.

The lower parts of Margate and of Herne Bay were inundated, and the houses filled with water.

At Broadstairs the old pier was submerged and considerbaly damaged.

The river Stour overflowed its banks and flooded the main streets of Sandwich ; the marsh land for nearly two miles inland was inundated, including

the golf links, and vehicular traffic along the main road between Sandwich and Ramsgate had to be suspended.

At Deal the water rose above shore level and flooded the streets and houses, considerable damage being done to the sea wall at the north end of the town.

At Dover the afternoon tide of the 29th rose 6ft. 1in. above its proper height, there being a difference of 8ft. between this tide and that of the next day.

At Newhaven the increased range of the tide was about 2ft. 4in., and at Portsmouth only 1ft. 8in. on the afternoon of the 29th.

The above is only a partial record of the immense extent of the damage done, the most serious amount of flooding perhaps that has been recorded, but it is sufficient to show the extent to which the tide may be influenced by gales of wind.—*Engineer*, December 17th, 1897.

FROMONDUS.

IN our number for August we gave a list of the editions of Fromondus's six books on Meteorology, known, or reported to us; three others have been mentioned since, either in these pages or in those of *Ciel et Terre*. It seems to us that it may be well to sum up the facts as far as at present ascertained.

It appears that Prof. Monchamp's quotation of an edition dated 1655 was a mistake for 1656—so that is disposed of.

M. Lancaster, relying upon the *Biographie Nationale*, published by the *Académie des Sciences de Belgique*, quoted* one of 1634, and in *Ciel et Terre* (1897, p. 431) he quoted one of 1631, but in *Ciel et Terre*, on page 503 both Prof. Monchamp and M. Lancaster appear to admit that neither of these editions ever existed.

The hypothetical edition of 1670, which we called F, is disposed of by the printer's signatures (see *Met. Mag.*, 1897, pp. 118 119).

We are not aware what librarians have adopted as the definition of an edition; we think that the prefixing of a new title page, with a fresh publisher's name, or a fresh date, distinguishes one issue from another, but Prof. Monchamp seems to think not, and he (*Ciel et Terre*, 1897, p. 503) treats editions B and D as two issues of one edition. In this he is mistaken. We have both, and not merely do the titles differ, but also the decorated initial letters and the ornamental headlines. Although at first sight it might be held that the body of the work was identical, for the two run word for word, line for line, and page for page; close examination will show that the whole work has been set up afresh, as stated on the title page. In proof of this many differences can be detected, we quote four instances.

Edition	B 1639.	D 1656.
Page 135, line 4, last word	Nam.	N$\widehat{a}$.
„ 153, line 11 from bottom	extrinsecum.	eXtrinsecum.
„ 175, „ 14 „ „	avertisse.	evertisse.
„ 449, „ 3 „ „	oculum.	oculu$\widehat{m}$.

* *Met. Mag.*, 1897, p. 118.

The final result is, that our list on p. 118 has, up to the present time, received no augmentations, and the only correction is that F disappears, and E can be called a 4to, although no one looking at it would do so.

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, December 15th, at the Institution of Civil Engineers, Mr. E. Mawley, F.R.H.S, President, in the chair.

The following candidates were ballotted for and duly elected :— Leonard Addenbrooke ; James Diggle, A.M.I.C.E., F.G.S. ; Ernest Romney Matthews, C.E. ; T. T. S. Metcalfe, J.P. ; William Ormerod, J.P.

Mr. R. C. Mossman, F.R.S.E., read a paper on the daily values of non-instrumental meteorological phenomena in London, from 1763 to 1896. The paper summarised records of snow, hail, gales, thunderstorms, fogs, &c., for each day in the last 134 years, thus exhibiting the daily march of the various phenomena throughout the year. Thunderstorms, it was shown, were at their maximum from the beginning of June to the middle of August, the greatest number being recorded in the week ending July 20th. A rapid decline set in at the beginning of August, and very few cases were recorded between October and March. Lightning, without thunder, was essentially a nocturnal phenomenon ; and increased rapidly after the summer solstice. During January fogs were considerably above the average, but they diminished rapidly after the middle of February, falling to a minimum at the beginning of July. A marked increase took place during September, when the autumnal fall of temperature set in. A great many fogs were recorded about the middle of October, but the maximum extended from November 5th to 24th. This applied also to the density of fogs, as during the above period no less than 27 per cent. of all the fogs recorded were designated "thick," or "dense." At the end of November fogs diminished both in number and in density, only 15 per cent. being recorded as "dense" in the fortnight ending December 8th. Snow was at its maximum at the beginning of January, but the values at the beginning of March were also high. There was a curious increase in snowstorms about the middle of April, and an equally marked decrease at the beginning of December. The increase in April took place at the time of "the borrowing days," (new style) while the diminution in December was associated with the occurrence of a mild stormy period, which recurred from year to year at the beginning of that month, with few exceptions. Storms were most frequent at the end of January, and at their minimum in August. With regard to the occurrence of equinoctial gales it was shown that storms diminished rapidly before, during and after, the vernal

equinox. During the second half of September a rapid increase took place, which rather supported, than otherwise, the popular opinion regarding gales at the autumnal equinox. On closer inspection it was seen that this period might be said to mark the termination of the tranquil summer conditions rather than the commencement of very stormy weather, which characterised the four months November to February.

Mr. W. Marriott read a paper on "the Rainfall of Seathwaite, Cumberland." This place has long been noted for its heavy rainfall, being, in fact, one of the wettest spots in the British Isles,—the average yearly amount is 137 inches. The spring months of April, May and June, are the driest, as they not only have the least rainfall, but also the least number of rainy days. August has the greatest number of rainy days. The heavy nature of the rainfall may be gathered from the fact that 21 per cent. of the falls are above 1 in., 2 per cent. being above 3 in. The greatest fall in one day was 8·03 in., on November 12th, 1897. The author has investigated the atmospheric conditions under which the heavy rainfalls occurred, and he finds that they are due to the direction and force of the wind. When the wind is blowing strongly from the south-east, or south-west, it will be concentrated in the valleys on the windward of Scafell, and rush up them with considerable force, the air current consequently being projected to a considerable altitude beyond Scafell. Owing to the reduction of temperature with elevation, the air parts with a great deal of its moisture, which falls as rain. With such a process going on continuously for a whole day, the heavy rainfall at Seathwaite is fully accounted for.

REVIEW.

Klima-Tabeller for Norge, of H. MOHN. II. Lufttryk. III. Luftens Fugtighed. Christiania. 1896 and 1897. Two parts, large 8vo, 80 pp. and 12 pp.

WE had the pleasure of noticing the first part of Prof. Mohn's excellent summaries of Norwegian meteorology, on p. 43 of our last volume; that dealt with temperature, the two parts now before us deal respectively with pressure, and with humidity.

As there are doubtless other parts to follow, we take this opportunity of expressing the hope that, before completing this valuable monograph, Dr. Mohn will give a map of the stations,—we are aware that he gives full particulars as to the lat. and long. of each, but it would be much more handy to have in the book itself a sketch map showing their distribution.

II. Lufttryk (Pressure). This is, like all Dr. Mohn's work, a thoroughly practical, well arranged, and nearly complete treatise,—we say nearly complete because some diagrams would add to its value. The first section gives full details as to the barometers used

at the central station, and a history of all the comparisons made between them and the standards at Kew, Greenwich, Paris, and other places. Then follows a life history of the barometers at 46 other stations. After this we have a specimen of the process adopted for completing short period records, a list of the stations with lat., long., altitude, beginning, ending and duration of the record, and particulars as to the normal stations, whence (if the record does not cover the whole of the 25 years, 1866-90) the values have been completed. Table II. gives for each station the mean pressure for each month, and for the year, on the average of 25 years. But we cannot go through all these excellent tables, in which apparently nothing has been forgotten. We must pick out one or two facts and pass on. Apparently the greatest and the least mean annual pressure at sea level are—

	in.	
Greatest.....	29·928	at Tonset, in Lat. 62° 17′ N., Lon. 10° 45′ E.
Least.....	29·768	at Gjesvær, ,, 76° 6′ N., ,, 25° 22′ E.

The individual extremes reduced to sea level are given by Dr. Mohn as—

	in.	
Highest..	31·174	on Feb. 6th, 1895, at Vardø, Lat. 70° 22′ N., Lon. 31° 8′ E.
Lowest..	27·760	on Jan. 27th, 1884, at Bergen, ,, 60° 23′ N., ,, 5° 21′ E.

III. Luftens Fugtighed (Humidity). This subject is treated very similarly to the Pressure, we need, therefore, say only a few words as to the results. As regards vapour tension, the maximum at all stations is in July *or* August, and most generally in July; the minimum is at all stations in January, February, or March, and most generally in February. The relative humidity is at its maximum at nearly every station in one of the four months August to November, the minima are spread over the spring months February to June.

Some marvellously low values are reported as the extremes of relative humidity; an entry of 3 at Vardø has a ? but there is 8 at Christiania, and 10 is reported from Domaas, Lærdalsøren, Brønø, and Bodø, and 11 or 12 at many stations. After that who will say that Norway is always damp ?

INCLINED AIR CURRENTS.

To the Editor of the Meteorological Magazine.

SIR,—It may interest you, and through you some of the readers of the *Meteorological Magazine*, to know that it is easy to observe the vertical component of the motion of the wind by means of a simply constructed wind vane, and that quite a new field of interesting investigation is thus opened up.

The vane I have constructed is of $\frac{5}{8}$ inch brass rod. At one end two saw cuts have been made, each at a right angle to the other, in the direction of its length, and in them are fixed two circular sheets

of brass, 6 inches diameter, intersecting at a right angle; the vane is altogether about 2 ft. long. It is pivoted at its balancing point in a metal support, which is fixed in a short length of brass tube, and rests on a metal point, fitting easily into this tube, so as to allow it, with the vane, to revolve in the horizontal plane freely, and the pivot allows it to oscillate, within limits, fixed by springs, of about 35° up or down from the horizontal. Placed at a height of about 50 ft. above the ground, it indicates the direction of the wind truly, both horizontally and vertically.

My observations hitherto made seem to indicate that strong winds sometimes blow at inclinations as great as at least, 30° above or below the horizontal, and that whether these comparatively steady inclinations are themselves parts of atmospheric waves or not—more rapid waves are very general. These observations, if verified, seem to be important to architects, engineers, and those who are endeavouring to work out the problem of a flying machine. One can notice how a bird, with its beautiful living organism adapted to its environment, can utilise these air waves in its soaring flight; but I fear that they will sorely disturb the equilibrium of any machine launched in the free air.

One observation, in the calm centre of a great cyclone of moderate intensity, seemed to indicate a steady, moderate, upward motion of the atmosphere there, replenished presumably from all sides below. This evidently is a very different thing from the violent upward motion in the centre of a small whirlwind. Generally there appears to be an upward motion in the centre of a V depression, and vice versa. The mechanism of land and sea breezes, with their upward and downward motions is well shown.

I am sure that a very wide field of investigation in connection with variations in barometric readings, influenced by upward or downward movements of the atmosphere, is open to any observers who provide themselves with simple instruments of this sort, and place them in open situations, at, I suppose, not less than 30 ft. above the surface of the ground.

I send you this short sketch of my early enquiries in this direction in the hope that if publicity be given to the subject, many meteorologists may be led to give their attention to it, and that combined observations, with good instruments, may largely increase our knowledge.

I am, sir, faithfully yours,

H. SCHAW,
Major-General, R.E., C.B.

Aurora Terrace, Wellington, New Zealand.
27th October, 1897.

[General Schaw's letter has come so far, and is in many respects so interesting, that we gladly insert it, and think it not improbable that some of our correspondents may take up the subject. The

General's instrument is evidently very inexpensive, but it produces no record. The first instrument, not merely to show, but to record, the inclination of the wind, was brought out by Dalberg, in 1780; those by Benzenberg, Cacciatore, Hennessy, and Dechevrens, are described by Professor Laughton in his "Historical sketch of anemometry." (*Quar. Jour. R. Met. Soc.*, VIII., (1882) pp. 174-175). We have an impression that an indicator of inclination was attached to the Atmospheric Recorder constructed by Mr. G. Dollond, for Mr. H. Lawson, and erected at Nottingham, but in neither of the descriptive pamphlets prepared by Mr. Dollond is there any reference to the subject. The last and most elaborate effort in this direction was made by Mr. L. M. Casella, and is described and illustrated in the *Quar. Jour. R. Met. Soc.*, XII., (1886) pp. 246-253.

The great cost of most of the recording patterns is an obstacle to their introduction, and most of them must be placed on piers or buildings which necessarily produce deflections in the very currents, the inclination of which they are intended to measure. We are therefore disposed to think that systematic observation of General Schaw's pattern, mounted on a very tall pole, would give more trustworthy results than any of the recorders.—ED.]

KITE FLYING IN SCOTLAND.

To the Editor of the Meteorological Magazine.

SIR,—With reference to the notice in the current issue of *Met. Mag.*, *re* Scientific Kite Flying, it may be of interest to state that several experiments with kites of the Blue Hill pattern have been made here during the past two months. No instruments have as yet been sent up, but we hope to have the ingenious apparatus of M. Richard at work soon. The trials have been carried out under the direction of Mr. John Anderson (late of Owensboro, Kentucky), and have, on the whole, been successful. An improved hand winch is at present under construction, which, with the substitution of piano wire for cord, will, we hope, yield satisfactory results.

I am, Yours very truly,

R. C. MOSSMAN.

10, Blacket Place, Edinburgh, Jan. 4th, 1898.

WARM WINTER NIGHTS.

To the Editor of the Meteorological Magazine.

SIR,—I think that the high minimum temperature of the night of December 17th, 1897, should not pass without notice. On the morning of the 18th I recorded 53°·2 in my Stevenson screen, and

52°·7 in the old screen, as the lowest temperature of the preceding 24 hours; both are verified thermometers. I had only one other minimum equalling 50°·0 in the nineteen Decembers from 1878 to 1896 inclusive, viz.: 50°·8 on December 4th, 1889. In the "Greenwich Met. Obs.," Part III., Temperature 1841–1890," there is no minimum in December exceeding 52°·0; this, therefore, seems to have been most exceptional.

While on the subject of high minima, permit me to point out what appears to be an error on p. 116, Vol. 28 of the *Met. Mag.* I find in the above Greenwich records that 60°·0 was the minimum on August 8th, 1846, and not 68°·0. The highest recorded at Greenwich during 50 years was 66°·1, on July 26th, 1872; that of August 18th, 1893, is therefore unprecedented since 1841. Again, minima above 60° can hardly be described as *very* rare; at Greenwich they average about four per annum, and in the *Met. Mag.* for September, 1897, p. 123, you state that at Camden Square you have two every August on the average.

Minima above 64° are very rare. Howard records eight in 25 years, the highest being 70° on July 27th, 1814. Mr. *Cowe's Register* records 26 in 46 years. Greenwich only four in 50 years.

Yours very truly,

CHARLES L. BROOK.

Harewood Lodge, Meltham, Dec. 20th, 1897.

[Mr. Brook is right and we were wrong in Vol. 28, but we can plead extenuating circumstances. It is printed (wrongly) in the Greenwich Observations for 1846 as 68°·0, but at that time observations were being taken every two hours, and from them it is obvious that 68°·0 is wrong, and 60°·0 right. We agree with Mr. Brook as to the use of the words "rare," and "very rare," and only think it necessary to add that a consideration of the position of the Rev. J. Cowe's thermometer (see the photo and plan in the volume) will explain the number of high minima recorded by him—the surrounding walls would radiate heat at night and prevent proper cooling. —ED.].

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JULY, 1897.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	83·6	24	44·0	8	75·8	55·3	52·9	68	130·1	36·1	·64	8	4·0
Malta	97·0	15	66·3	31	88·2	71·5	67·0	69	159·7	58·4	·09	2	2·0
Mauritius	78·5	23	59·8	13	75·9	64·9	59·6	71	121·5	50·4	1·50	10	5·2
Calcutta	97·7	3	74·6	14	88·5	78·7	77·8	84	156·3	74·2	13·45	18	7·7
Bombay	89·7	2	73·9	17	84·9	77·7	77·3	87	143·6	73·9	30·19	28	8·7
Ceylon, Colombo	88·2	...	73·0	4	86·5	78·1	73·7	80	139·0	71·0	5·24	22	6·4
Melbourne	66·1	30	34·6	29	57·0	44·5	44·0	78	115·2	26·0	2·45	14	7·2
Adelaide	67·7	17	38·9	28	60·0	46·5	45·8	79	124·2	29·2	1·81	16	6·0
Sydney	66·9	31	41·4	18	60·3	47·6	45·2	82	110·2	29·9	6·58	7	4·2
Wellington	62·0	26	31·0	20	54·8	43·3	39·5	71	105·0	21·0	3·31	20	4·5
Auckland	61·0	14	40·0	3	57·7	46·8	43·1	71	120·0	38·0	5·23	25	6·2
Jamaica, Kingston	92·4	23*a*	70·8	23	89·1	73·5	70·9	71	...	...	1·74	10	6·2
Trinidad	92·0	26*b*	67·0	15	87·6	70·6	73·8	83	167·0	66·0	13·88	23	...
Grenada	86·0	21	70·2	30	83·2	74·6	71·2	75	152·0	...	7·51	22	2·8
Toronto	93·3	5	53·0	15	81·4	63·5	64·1	74	109·4	50·2	5·24	13	4·4
New Brunswick, Fredericton	92·7	8	45·5	4	78·7	55·8	61·4	67	...	...	3·42	12	5·4
Manitoba, Winnipeg	88·5	17	47·0	12	79·0	56·8	...	...	...	...	5·38	14	5·8
British Columbia, Esquimalt	77·7	12	45·1	25	68·2	50·5	51·7	82	...	...	·97	8	4·8

a—and 30. *b*—and 27.

REMARKS.

MALTA.—Adopted mean temp. 78°·4, or 0°·9 above the average. Mean hourly velocity of wind 8·6 miles. Average sea temp. 80°·0. TS on 5th, L on 6th.
J. F. DOBSON.

Mauritius.—Mean temp. of air 1°·0 above, of dew point 0°·2 above, and rainfall ·76 in. below, their respective averages. Mean hourly velocity of wind 12·1 miles, or 0·3 above average; extremes, 29·1 on 22nd, and 2·0 on 24th; prevailing direction E.S.E.
T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 81°·6, or 1°·1 above, of dew point 0°·3 above, and rainfall ·84 in. above, their respective averages. Mean hourly velocity of wind 10·3 miles; prevailing direction S.W.
H. O. BARNARD.

Adelaide.—Mean temp. 1°·7 above the average of 40 years. Rainfall ·84 in. below average. In the northern agricultural districts the rainfall was generally above the average.
C. TODD, F.R.S.

Sydney.—Rainfall 2·34 in. above, humidity 5·5 above, and temperature 1°·6 above, their respective averages. Heavy general rains fell in continuance of those in June, and a high flood occurred on the Darling.
H. C. RUSSELL, F.R.S.

Wellington.—From 12th to 22nd generally showery, and also at the end of the of the month; the remainder fine. Variable winds, generally moderate. L on 8th, 15th, and 16th, and T and L on 19th. H on 8th, 17th, and 18th. Temp. 1°·4 above, and rainfall 3·03 in. below, the average. Slight earthquake on 8th.
R. B. GORE.

Auckland.—A showery and stormy month, rain being registered on 25 days, and the total nearly ·50 in. above the average. Mean temp. and barometric pressure both slightly above the average.
T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Frequent thunderstorms.
J. F. BRENNAN.

TRINIDAD.—Rainfall 4·43 in. above the average of 30 years.
J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, DECEMBER, 1897.

For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge (Harefield Pk.)	2·91	XI.	Rhayader, Nantgwillt ...	11·05
II.	Dorking, Abinger Hall .	4·25	,,	Lake Vyrnwy	8·94
,,	Birchington, Thor	2·63	,,	Corwen, Rhug	5·22
,,	Hailsham	3·51	,,	Criccieth, Talarvor	4·50
,,	Ryde, Thornbrough	3·31	,,	I. of Man, Douglas	5·36
,,	Emsworth, Redlands ...	3·09	XII.	Stoneykirk, Ardwell Ho.	4·48
,,	Alton, Ashdell	5·60	,,	New Galloway, Glenlee	11·81
III.	Oxford, Magdalen Col..	2·28	,,	Moniaive, Maxwelton Ho.	10·04
,,	Banbury, Bloxham	3·55	,,	Lilliesleaf, Riddell	4·62
,,	Northampton, Sedgebrook	2·39	XIII.	N. Esk Res. [Penicuick]	5·00
,,	Duddington [Stamford].	2·06	XIV.	Glasgow, Queen's Park..	5·56
,,	Alconbury	1·46	XV.	Inverary, Newtown	9·44
,,	Wisbech, Bank House...	1·45	,,	Oban, The Corran	6·90
IV.	Southend	1·94	,,	Islay, Gruinart School ...	4·16
,,	Harlow, Sheering..... ...	2·70	XVI.	Dollar.....	5·87
,,	Colchester, Lexden	1·77	,,	Balquhidder, Stronvar...	10·94
,,	Rendlesham Hall	1·53	,,	Ballinluig	(4·00)
,,	Rushall Vicarage	2·00	,,	Dalnaspidal H.R.S.....	9·07
,,	Swaffham	1·86	XVII.	Keith H.R.S.....	3·96
V.	Salisbury, Alderbury ...	5·64	,,	Forres H.R.S.	2·28
,,	Bishop's Cannings	3·95	XVIII.	Fearn, Lower Pitkerrie..	2·07
,,	Blandford, Whatcombe .	5·95	,,	N. Uist, Loch Maddy ...	7·11
,,	Ashburton, Holne Vic...	14·46	,,	Invergarry.....	12·26
,,	Okehampton, Oaklands.	9·29	,,	Aviemore H.R.S.	5·41
,,	Hartland Abbey	5·35	,,	Loch Ness, Drumnadrochit	5·77
,,	Lynmouth, Glenthorne.	8·73	XIX.	Invershin	3·64
,,	Probus, Lamellyn	6·77	,,	Scourie	...
,,	Wellington, The Avenue	6·02	,,	Watten H.R.S.....	2·17
,,	Wincanton.....	6·08	XX.	Dunmanway, Coolkelure	10·65
VI.	Clifton, Pembroke Road	4·31	,,	Cork, Wellesley Terrace	4·25
,,	Ross, The Graig	3·60	,,	Killarney, Woodlawn ...	11·85
,,	Wem, Clive Vicarage ...	2·23	,,	Caher, Duneske	4·42
,,	Cheadle, The Heath Ho.	3·75	,,	Ballingarry, Hazelfort...	3·54
,,	Worcester, Diglis Lock	2·57	,,	Limerick, Kilcornan ...	3·87
,,	Coventry, Priory Row ..	2·80	,,	Broadford, Hurdlestown	3·68
VII.	Grantham, Stainby	2·30	,,	Miltown Malbay	7·83
,,	Horncastle, Bucknall ...	2·01	XXI.	Gorey, Courtown House	4·22
,,	Worksop, Hodsck Priory	2·02	,,	Athlone, Twyford	4·48
VIII.	Neston, Hinderton	2·18	,,	Mullingar, Belvedere ...	3·84
,,	Southport, Hesketh Park	2·98	,,	Longford, Currygrane...	5·37
,,	Broughton-in-Furness ...	8·09	XXII.	Woodlawn	5·65
IX.	Ripon, Mickley.....	3·47	,,	Crossmolina, Enniscoe ..	7·78
,,	Melmerby, Baldersby ...	2·81	,,	Collooney, Markree Obs.	4·65
,,	Scarborough, Observat'y	1·52	,,	Ballinamore, Lawderdale	...
,,	Middleton, Mickleton ...	2·92	XXIII.	Warrenpoint.....	4·36
X.	Haltwhistle, Unthank...	4·16	,,	Seaforde.....	4·78
,,	Bamburgh	2·25	,,	Belfast, Springfield	5·38
,,	Keswick, The Bank.....	11·35	,,	Bushmills, Dundarave..	4·64
XI.	Llanfrechfa Grange	7·28	,,	Stewartstown	4·79
,,	Llandovery	7·48	,,	Killybegs	7·07
,,	Castle Malgwyn	8·39	,,	Lough Swilly, Carrablagh	5·61
,,	Builth, Abergwesyn Vic.	14·70			

DECEMBER, 1897.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours Dpth	Greatest Fall in 24 hours Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·20	+ ·13	·64	7	17	55·9	16	23·7	26	10	17
II.		Tenterden	3·28	+ ·65	·70	7	22	54·0	16*b*	21·5	26	10	16
,,		Strathfieldsaye	...	...	...	...	...	...	...	...	...	...	...
III.		Hitchin	2·32	+ ·29	·48	7	19	56·0	16	22·0	22	12	...
,,		Winslow (Addington)	3·07	+ ·62	·57	29	18	58·0	16	20·0	24	14	16
IV.		Bury St. Edmunds (Westley)	1·71	— ·53	·43	7	12	54·0	17	27·0	4	...	...
,,		Norwich (Brundall)	1·82	...	·33	7	17	54·2	17	21·2	23	9	20
V.		Weymouth(LangtonHerring)	...	...	...	...	...	...	...	...	...	...	...
,,		Torquay (Cary Green)	7·16	...	2·14	29	18	56·6	16	32·0	3	1	4
,,		Polapit Tamar [Launceston]..	6·27	+ 2·04	·99	29	22	57·1	16	27·6	3	4	11
VI.		Stroud (Upfield)	4·02	+ 1·57	·72	29	18	57·0	16	26·0	22	14	...
,,		ChurchStretton(Woolstaston)	3·63	+ ·58	·58	7	21	55·0	16	26·5	23	11	18
,,		Tenbury (Orleton)	...	...	...	...	...	...	...	...	...	...	...
VII.		Leicester (Rotherby Hall) ...	2·65	...	·76	4	21	...	...	...	...	...	...
,,		Boston	1·23	— ·62	·32	13	12	54·0	16	22·0	23	14	...
,,		Hesley Hall [Tickhill].....	1·98	·00	·34	7	18	58·0	16	19·0	24	14	...
VIII.		Manchester(PlymouthGrove)	3·72	+ ·28	·92	7	17	56·0	16	25·0	22	12	14
IX.		Wetherby (Ribston Hall) ...	1·02	— 1·42	·31	7	12	...	...	...	...	...	...
,,		Skipton (Arncliffe)	11·00	+ 4·19	1·56	7	23	...	...	...	...	...	...
,,		Hull (Pearson Park).	2·04	— ·23	·65	13	13	57·0	16*b*	24·0	22*f*	12	15
X.		Newcastle (Town Moor)	2·38	+ ·08	·80	7	18	...	..	...	...	...	...
,,		Borrowdale (Seathwaite).....	20·57	+ 5·76	2·50	29	23	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	6·92	+ 2·37	1·53	7	18	...	...	...	...	...	...
,,		Haverfordwest	7·41	+ 2·42	·76	5	21	56·0	17	26·2	3	5	18
,,		Aberystwith (Gogerddan) ...	3·69	— 1·19	·65	7	17	56·0	17	...	...	...	...
,,		Llandudno.....	3·77	+ ·81	·80	7	18	60·0	27	30·0	22	2	...
XII.		Cargen [Dumfries]	11·24	+ 7·22	1·80	26	20	56·0	17	20·0	23	12	...
XIII.		Edinburgh (Blacket Place)...	2·45	...	·39	28*a*	15	54·0	27	24·9	23	10	18
XIV.		Colmonell	6·97	...	·75	26	20	54·0	27	25·0	2	...	...
XV.		Lochgilphead (Kilmory).....	...	...	...	...	...	...	...	...	...	...	...
,,		Mull (Quinish).....	6·35	— 1·22	·81	6	21	...	...	...	...	...	...
XVI.		Loch Leven Sluices	6·00	+ 2·69	·90	9	15	...	...	...	...	...	..
,,		Dundee (Eastern Necropolis)	3·35	+ 1·27	·50	5	19	52·6	17	21·9	23	12	...
XVII.		Braemar	4·99	+ 2·52	·81	8	17	50·0	27	16·0	23	18	29
,,		Aberdeen (Cranford)	3·68	...	·90	10	23	51·0	26	20·0	22*f*	18	...
,,		Cawdor (Budgate)	3·04	+ ·58	·50	8	23	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	8·91	+ 3·14	1·50	27	13	...	...	..	...	..	...
,,		Glencarron Lodge.....	9·65	...	1·25	8	22	53·6	26	21·2	22	13	...
XIX.		Dunrobin	2·78	— ·59	·81	8	13	51·0	27	23·8	23	10	...
,,		S. Ronaldsay (Roeberry).....	4·40	+ ·74	·60	11	17	49·0	17*c*	32·0	2	1	...
XX.		Darrynane Abbey.....	6·25	...	·63	12	22	...	..	...	...	...	...
,,		Waterford (Brook Lodge) ...	5·48	+ 1·84	·82	12	21	56·0	26	29·0	3	2	...
,,	IRELAND.	O'Briensbridge (Ross)	5·27	...	·54	25	19	..	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	3·47	+ ·35	·53	7	23	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	1·84	— ·32	·26	5	18	57·8	27	32·9	3	0	12
XXII.		Ballinasloe	4·59	+ 1·17	·90	26	21	50·0	16	28·0	31	5	...
,,		Clifden (Kylemore)	11·91	...	1·58	29	24	...	...	...	...	.	...
XXIII		Waringstown	4·57	+ 1·53	1·07	26	17	55·0	16*d*	28·0	2*g*	8	19
,,		Londonderry (Creggan Res.).	4·62	+ ·41	·62	26	21	...	...	...	...	...	...
,,		Omagh (Edenfel).....	4·65	+ ·97	·93	26	20	52·0	7*e*	29·0	22	10	16

\+ Shows that the fall was above the average ; — that it was below it.

a—and 29. *b*—and 17. *c*—and 26. *d*—and 26, 27. *e*—and 16, 25. *f*—and 23. *g*—and 22.

METEOROLOGICAL NOTES ON DECEMBER, 1897.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

TENTERDEN.—A wet month at last, but not enough R to fill up ponds and springs. The second week very wet, and the last five days showery. Much wind at times. Hard frost from 22nd to 26th. Duration of sunshine 67 hours. Dense fog nearly all day on 18th. Gales from S.W. on 7th, N.W. on 11th, and S on 29th and 30th. On 1st, 6 hrs. 40 min. of sunshine, and on 25th, 6 hours.

ADDINGTON.—Max. temp. rather high at times; from the 13th to the 17th it averaged 54°, and from the 24th to the end, 50°. Sharp frost on the 4th, and again from 23rd to 26th. On the 18th thick fog all day. Wind high on several days. Floods on the 15th and 30th.

BURY ST. EDMUNDS, WESTLEY.—A mild and windy month, with no snow.

NORWICH, BRUNDALL.—A mild and stormy month, with some sharp rime frosts at Christmas. At the close of the month violets, chrysanthemums and Christmas roses were in full bloom in the garden, with winter aconites and snowdrops coming through the soil, and nearly ready to bloom. H, sleet, and a few flakes of S on 2nd. Gales on 7th, 29th, and 30th.

TORQUAY, CARY GREEN.—Rainfall 3·69 in. above the average. Mean temp. 46°·0, or 3°·1 above the average. Duration of sunshine 79 hrs. 10 min., being 27 hrs. 5 min. above average; 10 sunless days.

POLAPIT TAMAR.—Very wet and stormy, and unseasonably warm. H on 1st, 8th, 9th, and 28th. L and T at 4.30 p.m. on 14th. Gales from S. on 7th and 10th, W.S.W. on 8th and 13th, S.S.W. on 16th, 26th, and 29th.

STROUD, UPFIELD.—S.W. gales on 7th, 13th, 16th, 28th and 29th. L and T on 14th.

WOOLSTASTON.—Stormy weather prevailed in the early part of the month, with heavy gales on 7th and 8th, and again on 26th and 29th. There was a good deal of sharp frost, but the middle of the month was mild and genial. Mean temp. 39°·4.

ROTHERBY HALL.—Rainfall ·65 in. above the average, and the month was dull and damp, with much wind. On the 4th more than half an inch of S fell. On the 23rd the temp. on grass fell to 12°.

HULL, PEARSON PARK.—H on 2nd. Fog on 5th, 12th, 13th, 14th, 18th, 19th, 22nd, 23rd, and 24th. Stormy on 28th, 29th and 30th.

WALES.

HAVERFORDWEST.—December was wet and stormy up to the 16th, with temp. above the mean, and vegetation in a luxuriant condition; a mild frost then set in, with much mist and fog, and grass temp. rather low (18°·6 on 23rd), this weather lasted until the 25th. Another stormy wet period followed, which lasted to the end of the month. The wettest December since 1891, when 7·87 in. fell.

ABERYSTWITH, GOGERDDAN.—Strong gales from 27th to 30th.

LLANDUDNO.—T and L on 30th. Lunar halo on 12th. Rainbows seen on six days, that on 27th lasting for four hours.

SCOTLAND.

CARGEN [DUMFRIES].—A month of wet, unsettled weather, the rainfall (11·24 in.) being the heaviest in any month since observations commenced in 1860, the nearest approach to it being 10·72 in. in October, 1874; 6·50 in. fell in the last six days, quite the heaviest fall ever experienced here. The fall of 1·80 in. on 26th has been exceeded on only 5 days during 38 years. The mean temp. is 1° above the average for December, and on only 11 days did the minimum fall below 32°. On 26th it blew hard from S.E., and easterly winds prevailed on 14 days. T and L occurred on 4 days, and a severe TS, during which the L was very vivid, on the evening of the 30th; slight S fell on 8th. Sunshine was conspicuous by its absence, and during 18 days the sun was never seen.

EDINBURGH, BLACKET PLACE.—S on 1st and 8th. Dense fog on 18th, 22nd, 23rd, and 24th.

COLMONELL.—Rain 1·90 in. above, and mean temp. 4°·1 above, the average of 21 years.

MULL, QUINISH.—With the exception of a week of fine weather, with some frost from 18th to 24th, the month was mild, wet and stormy. A gale of unusual violence blew from S.S.W. on the 30th.

BRAEMAR.—A wet, but open month.

ABERDEEN, CRANFORD.—Very mild and warm, the mean temp. on some nights being between 40° and 45°.

S. RONALDSAY, ROEBERRY.—Not a bad month upon the whole, although the rainfall is ·93in. above the average of 30 years. Mean temp. 40°·7, or 1° above the average.

IRELAND.

DARRYNANE ABBEY.—A wet, but mild month; the middle part very wild and stormy. N.W. gale with H showers on 8th. Strong S.W. gale, and very heavy sea on 15th.

WATERFORD, BROOK LODGE.—H and sleet on 8th. H on 13th, 27th, and 30th. The Comeragh mountains well covered with S on 9th. Mean temp. 44°·8.

O'BRIENSBRIDGE, ROSS.—A very dreary and wet month, excepting one week from 16th to 24th, Frequent and severe gales, mostly from S.E.

DUBLIN, FITZWILLIAM SQUARE.—A changeable open month, with frequent, but not heavy rain, and almost entire absence of frost. Mean temp. 44°·9, or 3°·6 above the average. A lunar halo was seen on the 9th. High winds were noted on 15 days, and attained the force of a gale on 7 occasions. Foggy on 7 days. S and sleet on the 8th; H on the 14th. Aurora borealis on the 11th. L on the evening of the 14th.

KYLEMORE HOUSE.—Gales on 3rd, 8th, 13th, 26th, 27th, and 29th. Weather very wild on 14th, 15th, and 28th.

OMAGH, EDENFEL.—Another mild month, with considerable rainfall, but no snow or frost of any severity. Christmas day was especially soft and springlike with a mean temp. of 46°·5

END OF VOL. XXXII.

Duplicate Meteorological Books.

IT is a long time since I could make even a partial clearance of duplicates, and, therefore, this list is longer than usual. No money should ever be sent with the order, as probably several books may be gone; but a note of the cost and carriage will be enclosed in the parcel, and the amount must be sent by return, as no accounts can be kept.

G. J. SYMONS.

62, CAMDEN SQUARE, N.W.

ABBE, C. Preparatory Studies for Deductive Methods in Storm and Weather predictions	1890	8vo.	2/-
ABBE, C. Agricultural Science.—On the Production of Rain.	1892	8vo.	1/-
ARISTOTLE. Aristotelis operum omnium Græcè et Latine, 2 vols. (with John Ray's autograph)	1606-7	8vo.	7/6
ARISTOTLE. Aristotelis Meteorologica et de Mundo ...	1832	16mo.	1/-
BAILY, F. Description of a new Barometer in the apartments of the Royal Society	1837	4to.	1/-
BAKER, E. E. Extraordinary Snows, 1674	1887	4to.	2/6
BARBER, Rev. S. Cloud Outlines	1878	8vo.	-/6
BOYLE, Hon. R. New Experiments and Observations touching Cold, &c.	1683	4to.	2/6
Brit. Assoc. Committee. Report on Observations of Luminous Meteors. (1862)	1863	8vo.	1/-
BUCHAN, A. Handy Book of Meteorology. Rare 2nd edit.	1868	8vo.	7/6
CANTONI, Prof. G. La Temperatura Propria dell Aria e lo Psicrometro Ventilatore	1879	sm. 4to.	1/-
CANTONI, Prof. G. Su gli Evaporimetri	1879	sm. 4to.	-/6
CAPPELLETTI, E. M., S.J. Dictamen sobre la Improbabilidad del Temblor, &c.	1887	8vo.	-/6
COOK, J. Meteorology in Mysore, 1895	1896	4to.	1/-
CRULS, L. Méthode Graphique pour la Détermination des heures approchées des éclipses du soleil et des occultations	1894	8vo.	1/-
DAVIS, G. G. Anales de la Oficina Meteorológica Argentina, vol. ix.	1893	4to.	2/6
DAVIS, G. G. Anales de la Oficina Meteorológica Argentina, vol. x.	1896	4to.	2/6
DE ALMEIDA, F. A., Jun. De motibus aeris Dissertatio ...	1876	8vo.	-/6
DE GL'ANGELI, S. Della Gravita dell Aria e fluidi, &c. (rare early engravings of Barometers)	1671	sm.4to.	2/6
DENZA, F. I Freddi. Jan., 1893	1893	4to.	-/6
DENZA, F. Fotografie della Stella Nova Aurigæ	—	4to.	-/6
DERHAM, W., F.R.S. Hooke's Philosophical Experiments and Observations, with autograph of author	1726	8vo.	2/6
EATON, H. S. Dorset Annual Rainfall, 1848-92	1895	8vo.	1/-
ESPY, J. P. Espy's 2nd and 3rd Reports on Meteorology (many Maps and Diagrams) ... ... —	oblong	4to.	5/-
FORSSMAN, L. A. Des Relations de l'Aurore Boréale et des Perturbations Magnétiques avec les Phénomènes Météorologiques	1872	4to.	1/-
FOURNET, J. Note sur un effet de Coloration des Nuages...	—	8vo.	-/6

GALTON, F., F.R.S. Meteorographica; or, Methods of Mapping the Weather. Illustrated by upwards of 600 Printed and Lithographed Diagrams for Dec., 1861. Scarce..	1863	4to.	7/6
GASTER, F. Report on Experiments with Thermometer Stands in 1869, at Strathfield Turgiss...	—	4to.	2/-
GEISENHEIMER, Dr. Erdmagnetismus und Nordlicht ...	1874	8vo.	-/6
GILBERT, G. K. A new method of Measuring Heights by means of the Barometer	1882	4to.	4/-
GODFRIDUS. The Knowledge of Things Unknown. (See *Met. Mag.*, August, 1896, p. 105)	1707	16mo.	7/6
GRÜTZMACHER. Jahrbuch der Meteorologischen Beobachtungen der Wetterwarte der Magdeburgischen Zeitung, 1892	1893	4to.	1/-
HELLMANN, Dr. G. Grösste Niederschlagsmengen in Deutchland mit besonderer Berüchsichtigung Norddeutschlands	1884	4to.	1/-
HERGESELL, Dr. H. Ergebnisse der Meteorologischen Beobachtungen im Reichsland Elsass-lothringen im Jahre 1890, 92, 93	1895	4to.	1/6
HINRICHS, Dr. Iowa Weather Service. Set of Reports, 1-3 Biennial, 1880-3 and 1878-83 (except 4th quarter of 1881)	1879-84	8vo.	2/6
HOSIE, A., M.A. Droughts in China, A.D. 620 to 1643 ...	—	8vo.	2/6
HOWARD, L., F.R.S. Papers on Meteorology, relating especially to the variations of the Barometer. Pt. I.	1854	4to.	2/-
HUNT, H. A. Essay on Southerly Bursters	1894	8vo.	1/-
KAEMTZ, L. F. A Complete Course of Meteorology, with additions by C. V. Walker. (Perfect copy with all the plates)	1845	8vo.	4,6
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